houses. By comparing the two series, those visiting and bred from excrement and those found in houses, it is at once apparent what species are liable to carry disease germs. The results show that practically all of the house flies occasionally breed in or visit human excrement. It is thus possible that almost any house fly may carry the germs of typhoid fever. The next step in this process, *viz.*, to find out by experiment whether flies actually carry germs on their tarsi and labellæ, was not investigated.

No less than thirty-six species of flies were reared from excrement, and forty-one other species captured visiting the same material. Among those bred were the common house fly (*Musca domestica*), and the pomace fly (*Drosophila ampelophila*). The latter is an especially dangerous species, as it not only frequents houses, but also occurs on grapes and other fruits exposed on the market.

In the course of the work, many new and interesting observations of purely scientific value were made on the life history of various species. A large amount of the disagreeable work was performed by Mr. F. C. Pratt, and the determination of the flies rests on the authority of Mr. D. W. Coquillett. N. B.

Trematode Fauna of Egypt.[1] — Just as the earlier works of Looss marked a new epoch in the study of the comparative anatomy of the distomes, so the present paper is destined to be the starting point of a movement toward the rational dismemberment of an ancient and honorable genus — Distomum. Not that others have failed to recognize its heterogeneous character, or to attempt its dissolution, but that up to the appearance of the paper under discussion no one has indicated a reasonable way to the end desired. Many authors have recognized groups of forms whose relationship was evident, and yet have failed to give such groups their true position as genera, or have seized upon single and insufficient characters to delimit them. Thus Rudolphi endeavored to employ external features, which in a group of such uniform exterior does not suffice; Dujardin selected a single feature, the character of the alimentary canal, for the major part of his genera, while both Diesing and Monticelli erred in the same direction. To be sure, certain small groups were recognized and set off from the remainder, but the systems proposed have never met general acceptance, probably

[1] Looss, A. Weitere Beiträge zur Kenntniss der Trematoden-Fauna Aegyptens, zugleich ein Versuch einer natürlichen Gliederung des Genus Distomum Retzius, *Zool. Jahrb.*, Abt. Syst., Bd. xii, pp. 521–784, 9 pls.

because of their inadequacy and of the heterogeneous character of the genera so formed. Then even the groups which were best made were taken as subgenera rather than in their true place as genera, and even subfamilies, which Looss is unquestionably the first to recognize in any broad way. This view does not in the least underestimate the admirable work of Braun and Lühe, which has appeared almost synchronously with that of Looss, and which, though dealing with fewer forms, furnishes evidence of the naturalness of the proposed dismemberment by the independent selection of identical groups.

Looss discusses first the law of priority in relation to helminthology, and advocates on cogent grounds the dating of generic names in this field from Rudolphi, "the Linnæus of helminthology." Though much to be desired, his proposal must still be regarded as impracticable in view of the close relation of synonymy in all groups. Looss protests strongly, and, most will admit, rightly too, against the use of conjecture in restoring old generic names and cities from Rudolphi Hemiurus and Echinostoma as recognizable and evidently good genera, with Sphærostoma as unrecognizable and Schisturus which depends upon pure conjecture. The law of priority is based upon the legal presumption that the literature is available everywhere, but a comparison of original specimens is not called for, since they exist, if at all, in a few places at most. The replacement of specific names, already well fixed, by comparison of the originals is hence in violence with the wording of the law ; if, however, it is to be carried out, general interests demand the earliest possible revision of all originals, since in this way the least disturbance will be produced. Names of species which do not exist in original specimens and which are not recognizable should be dropped at once so as not to burden the literature further. Looss then refers to the custom of Rudolphi in citing unknown parasites by the name of the host in genitive; *e.g.*, *Distoma meropis*, which should be interpreted as "a distome from Merops," but which, as the author wrote in Latin, has the outward form of a generic and specific combination. Such names are pure *nomina nuda*, since a diagnosis is lacking and were so regarded by the author, since he never used a genitive as a specific name, and since he also never omitted the "R." which is lacking after these, from the new species actually described.

The second section of the paper on the taxonomy of the distomes opens with a discussion of previous efforts in this direction, and of the great disparity in form and structure between Bilharzia,

Apoblema, and other forms. For the diœcious distomes a new family, the Schistosomidæ, is created, and the remainder, constituting many subfamilies, is left in the family Distomidæ. Since, however, the genus Distomum is nonexistent, this ought to have been changed to Fasciolidæ. A similar change is necessary with the name Monostomidæ, but what name shall be used in its place is not now clear.

Looss then gives the following scheme of the classification as emended, in connection with which it should be noted that there are numerous genera whose position even yet is a matter of doubt, and that this is not regarded by the author as in any sense a complete system :

A. Aspidocotylea Mont.
(remains unchanged)
Metastatica Lkt.
B. Malacocotylea Mont.
Family HOLOSTOMIDÆ Brds.
(remains unchanged)
Digenea s. str. Lkt.
Family DISTOMIDÆ Mont. (partim)
Subfamily Amphistominæ Looss (= Family AMPHISTOMIDÆ Mont.)
" Fasciolinæ Lss.
" Omphalometrinæ Lss.
" Opisthorchiinæ Lss.
" Echinostominæ Lss.
" Cœnogoniminæ Lss.
" Philophthalminæ Lss.
" Lepodermatinæ Lss.
" Gorgoderinæ Lss.
" Brachycœliinæ Lss.
" Pleurogenetinæ Lss.
" Cephalogoniminæ Lss.
" Dicrocœliinæ Lss.
" Syncœliinæ Lss.
" Heterolopinæ Lss.
" Urogoniminæ Lss.
Family (inquir.) RHOPALIADÆ[1]
" SCHISTOSOMIDÆ Lss. { Koellikeria Cobbold; Schistosomum Weinland; Bilharziella n.g.
" GASTEROSTOMIDÆ Braun
" DIDYMOZOONIDÆ Mont. } Remain unchanged
" MONOSTOMIDÆ Mont.

[1] According to the recent investigations of Braun (*Zool. Anz.*, Bd. xxiii, p. 27) closely related to the Echinostominæ and consequently not of family rank.

According to Looss the formation of a special genus is warranted when a certain definitely circumscribed complex of characters can be recognized in two forms which also agree in other respects; yet genera may be founded on single forms of evidently isolated structure. While general appearance is of value, yet internal anatomy is the real basis of subdivision, and just this is, in fact, little known, partly at least owing to ignorance regarding the relative importance of characters. Among the most weighty generic characteristics are the copulatory organs which show the following types: (1) No muscular cirrus sac closed proximally and distally about the duct and seminal vesicle, together with the constant, if often weakly developed, prostate which lies (*a*) free in the parenchyme, or (*b*) enclosed in a connective-tissue covering open at both ends; (2) a closed muscular cirrus sac which encloses (*a*) the genital sinus, *i.e.*, the more or less elongated common terminal portion of both male and female ducts, or (*b*) only the end of the male duct. Here again the cirrus sac may enclose (*a*) seminal vesicle, prostate, ejaculatory duct, and protrusible cirrus, or (*b*) only the last three, the vesicle lying in the parenchyme, or (*c*) the prostate also is free, while only the duct and the cirrus are enclosed in the sac. The course of the uterus in the body is also an important generic character, while the size of the eggs is uniform within narrow limits in any genus. Of specific value are the size and form of organs in detail, the extent of the vitellaria, a very constant feature in any species, and similar details.

In the section treating of the characters of the subfamilies and genera one finds a great variety in manner of treatment. Most groups are considered *in extenso* with full-faced headings which claim immediate attention, but there are those which are introduced in the middle of a topic under another heading, or even rarely one finds a new genus thrown in parenthetically which, in the absence of key and index, makes its discovery difficult. Still the work is generally free from such slips, and the absence of a key is attributable to the often repeated assertion of the author that this is a fragment and not a finished system, having for its primary object the demonstration of the existence of natural groups of family and generic rank within the limits of the old genus Distomum Retzius.

From this section, as well as from the fourth and last, which contains a description of the new and little known species that have been studied by the author, it is hopeless to give here anything regarding the wealth of descriptive and comparative matter which is offered. It is not too much to say that no other helminthologist is

the equal of Looss in deciphering, delineating, and comparing the anatomical structure of trematodes, and it would be hard to find, save in his own work, the equal of the nine plates he has given to illustrate this work. Some mention is made of a total of eighty-four genera, including twenty-three old and sixty-one new; of the latter, three are clearly antedated by names proposed by Braun, five correspond to groups named by Lühe in a publication of identical date,[1] and four are provisional. Among the fifty-two species described twenty-four are new. One can only regret that the author did not give an index or table of contents, if debarred from forming a key by the incompleteness of his system. As it is, reference to any section or topic is not an easy matter. It may also be said that in rare instances the author fails to apply the principles he has laid down, without giving any reason for the exception; but some slips are unavoidable in a work of such magnitude, and do not detract from its permanent value. Though Looss disclaims having formed any complete system, his work comes nearer that than any one else has yet reached, and will be the foundation on which such a system is to be built.

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BOTANY.

Primitive Algæ and Flagellata.[2] — In reviewing Dr. Blackman's paper, the writer has not mentioned the authorities for the arrangement given therein, which may be found on reference to the paper itself. The article is of the nature of a review of recent work, and the following is but a condensation of its most important points.

The older arrangement of the Chlorophyceæ, given by Wille in Engler and Prantl's *Pflanzenfamilien*, is largely an artificial one, and consequently subject to changes. Of the three groups named by him, the Siphoneæ, Confervoideæ, and Protococcoideæ, only the first

[1] It appears to me clear that both the intent and the wording of the rules covering the choice in case of synchronous appearance of different names for the same forms call for the preference of the extended discussion over the preliminary notice, certainly in all cases where types are named. Under this interpretation Looss's names stand as against Lühe's, save for Dolichosomum, which is preoccupied, and hence gives way to Ithyogonimus Lühe rather than to Dolichodesmus Looss (*Zool. Anz.*, Bd. xxiii, p. 603) of later date.

[2] Blackman, F. F. The Primitive Algæ and the Flagellata, an Account of Modern Work bearing on the Evolution of the Algæ, *Annals of Botany*, vol. xiv, No. lvi (December, 1900), p. 647.